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DUNGENESS CRAB POTS

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Introduction

Crab pots are individual trap-like devices used to fish commercially for the Dungeness crab, Cancer magister, (Figure 1), which is native to the Pacific Coast from San Francisco, California, to Kodiak, Alaska. The crabs are found to inhabit sandy and grassy bottoms below the tidal range. Commercial fishery regulations governing the Dungeness crab fishing of the Pacific Coast states and Alaska do not permit the use of any other type of gear than crab pots. More than 64,000 pots, valued at $1\frac{1}{2}$ million dollars, are used annually to catch nearly 31 million pounds of crab. These figures are based on a nine year average, 1946-1954.

The pots used in this fishery are of two types -- (1) circular and (2) rectangular. The circular pot is known as the standard-type Dungeness crab pot and is the more commonly used of the two. Since the majority of the Dungeness crab are caught in the open coastal areas, the pot is designed and constructed so that it will remain in an upright fishing position on the ocean floor regardless of heavy wave action or tidal currents.

Figure 1 - The Dungeness Crab

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The Circular Pot

The typical circular pot (Figure 2) is about 42 inches in diameter, 14 inches in depth, and has two side openings, called tunnels, for the crabs to enter; and weighs about 90 pounds without the line and buoys. The bottom of the pot is about two inches larger in diameter than the top and has two iron bars reaching across the bottom frame. The legs, or supports, are curved so that the pot will always fall on the bottom frame, or right side up. The entire pot is handwoven with 19-gauge (1/32") Monel wire. The top and bottom rings and the legs are made of mild structural steel rod.

Rectangular Pot

The rectangular pot (Figure 3), box-like in shape, is lightly constructed and weighs about 35 pounds. The dimensions are about 30 inches square and 12 to 14 inches in height. The frame is covered with a heavy-gauge chicken wire. The two openings, or eyes, through which the crab enters the pot, are placed on opposite sides. The mesh is cut and the eye frames are attached to the mesh, then drawn taut by wires extending from each opening to the other. The wire mesh usually corrodes in about three months, and is then replaced with new wire.

Because of the light weight and box-like shape of this type of pot, its use is confined to the inside, protected waters where it can be fished from small boats and lifted or hauled by hand. The large ground swells and strong tidal currents which occur in the open exposed areas will cause this type of pot to tumble on the ocean bottom. For this reason, it is not suitable for fishing in open areas.

Construction of a Circular Pot

Some commercial crab fishermen prefer to build their own pots, although they are now produced commercially and are available in fishermen's supply stores along the Pacific Coast. A circular pot equipped with line, buoys, and bait box costs about $26.00. When crab fishing was first extended to the outside coastal areas, pots averaged about 30 inches in diameter. Since that time, fishermen have been making the pots larger, until they now average about 42 inches in diameter.

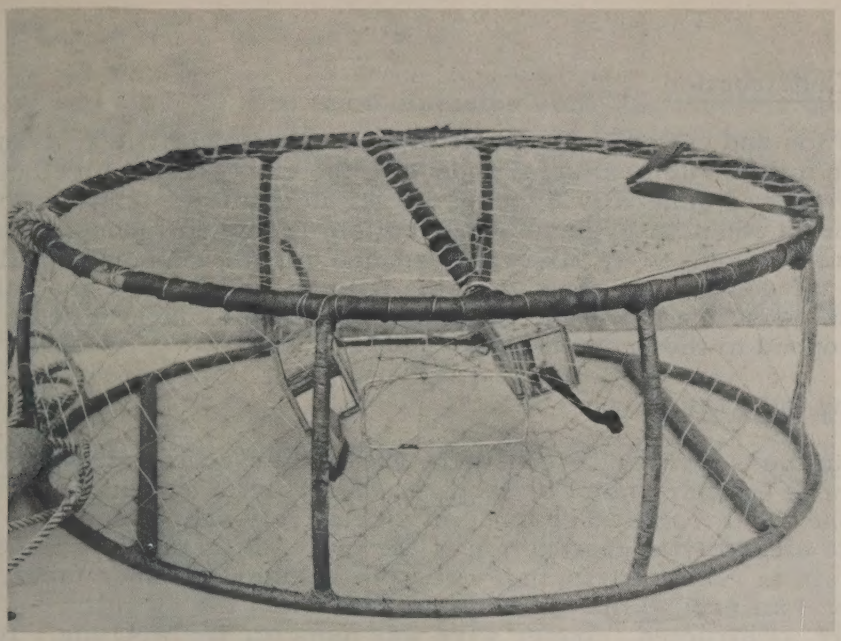

Figure 2 - A standard-type Dungeness crab pot.
(42-inch diameter)

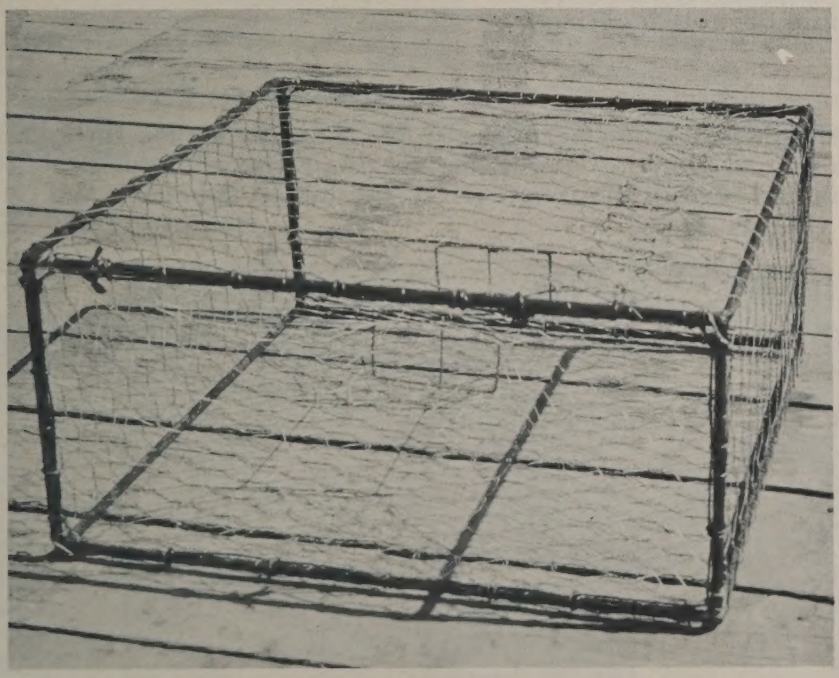

Figure 3 - A rectangular Dungeness crab pot. Its use is confined to inside protected waters.

Frame Construction

The top and bottom circular frames are built with 1/2 to 1-inch diameter mild structural steel rods with the ends welded together. The bottom frame is generally 2 inches larger in diameter than the top; the top frame is about 42 inches and the bottom frame 44 inches. The frames are supported by six evenly spaced upright supports, called legs, of the same diameter rod as the frames. Thes legs are convexly curved to cause the pot to fall on the bottom frame, right side up upon being dropped to the ocean bottom.

Insulating the Frames

If stainless steel and Monel wire are immersed in salt water in contact with ordinary steel or iron, an electrolytic action results which causes the steel frame to corrode in a relatively short time. To minimize this electrolytic destruction of the crab pot frame, the fishermen wrap it with a rubber stripping, cut from automobile inner tubes, which is drawn taut around the the framework. When the circular pot was originally constructed, copper wire was used for the webbing. However, it was found that although copper wire is soft and easy to weave, the electrolytic action was so great that the pot frames would last not more than three months. Rubber insulation was then used, which increased the life of the pot to about three years. After stainless wire was introduced, the life of the pot frame was greatly increased but electrolysis was not completely eliminated. To insure maximum life of the frames, they should be well insulated.

Tunnels

The tunnels leading into the pot are the approaches through which the crab enters the pot. The tunnels extend inward from 12 to 15 inches. An eye is fastened to the inner end of the tunnel approach and is the true opening (Figure 4).

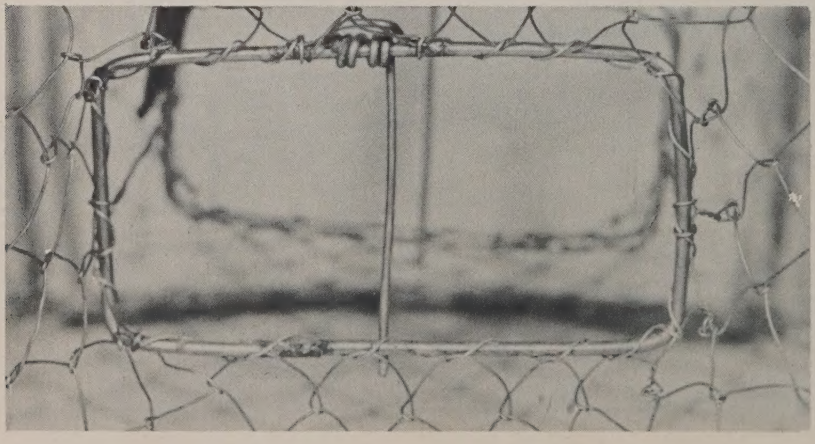

Figure 4

The tunnel opening and trigger wire.

The eye is made of 3/16 -inch diameter stainless steel or Monel rod with the ends welded together. The size varies between 4 to 5 inches vertically and 7 to 8 inches horizontally. A trigger, or gate, made from heavy-gauge stainless wire extends down and across the bottom of the eye. As the crab crawls into the pot, the trigger is automatically pushed inward. After the crab enters, the wire falls back into place, preventing escape.

The dimensions of the tunnel are governed by the distance between the upright supports, usually between 20 and 22 inches.

Webbing

Stainless steel, or Monel wire, 19-gauge (about 1/32-inch in diameter), is preferred for crab-pot webbing. The entire pot is webbed with wire of the same gauge. The tunnel approaches are webbed first. The pot is then webbed in sections, beginning at a leg by the tunnel and weaving from one leg to the next, clockwise around the pot to the opposite tunnel. The wire is half hitched into webbing, usually two inches on a side. All the webbing is drawn taut except that at the bottom of the pot. The bottom webbing is left slightly loose so that the pot can rest better on the rough ocean floor.

Pot Lid

A hinged lid, made from 1/4-inch stainless steel, or Monel rod, is fastened to the cross rod on the top frame of the pot. The lid is also webbed(Figure 4). It is fastened by means of rubber bands, cut from inner tubes which are fastened to the top pot frame, lapped over the lid, and attached to a wire clip that hooks into the webbing. This fastening not only facilitates the opening of the pot for baiting, but also aids in removing the crabs from the pot.

Bait Boxes

Bait boxes are generally constructed of metal or wood (Figure 5).

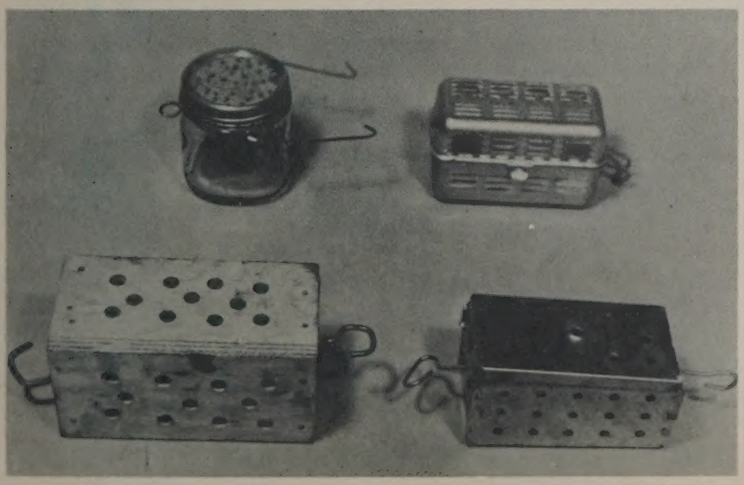

Figure 5

Bait boxes. Plywood and metal are preferred. Glass jar is used when sea lice appear in great numbers.

The metal boxes are light-gauge stainless steel about 6 inches long, 4 inches deep, and 4 inches wide. Bait boxes, whether metal or wooden, have small perforations, or slits, on the sides, ends, bottom, and top, to permit the bait essence to escape. The metal bait boxes cost about $1.25 each, and the wooden boxes are purchased, knocked-down, for about $.60 each.

The glass-jar type of bait box is used during those times when large numbers of sand fleas appear. Tiny holes that let the sssence escape but which are too small for the sand fleas to gain entrance are punched in the lid.

Regardless of the type of bait box used, it is always centered in the pot between the two tunnel openings (Figure 6). Both metal and wooden boxes have heavy wire hooks protruding from each end. These hooks are fastened to rubber bands which in turn are fastened to the legs at the tunnel entrance.

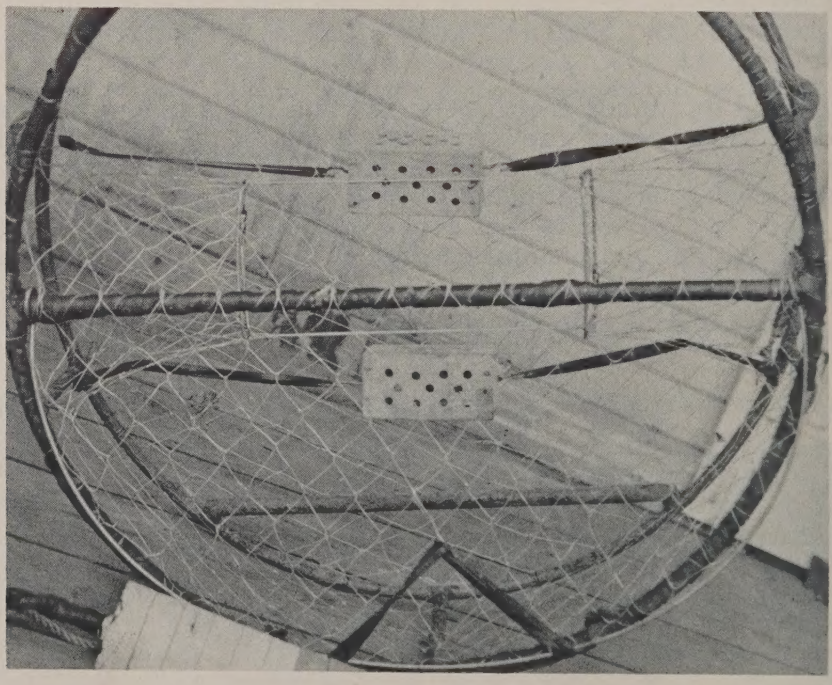

Figure 6 - The hinged lid, depth of the tunnel approaches, and cross wires extending from one opening to the other.

Buoys

Buoys are available in wood, cork, or plastic, and can be purchased at fishermen's supply stores. Buoys are thoroughly dried and repainted after each season's use. Wooden buoys are usually made from either dry cedar or white pine. In making a cork buoy, about 10 cork floats, 2 inches deep and 6 inches in diameter, are cemented together and painted. The cork and plastic floats are more buoyant than the wooden floats and require less maintenance. The plastic floats are a recent development and, being new on the market, are not yet widely used.

Two buoys, usually of different shape, are used for the surface float. One additional small float, cork or plastic, is set below the surface normally about six feet above the pot on the buoy line, and prevents chafing by keeping the line off the bottom. It also serves to keep the buoy line from catching on submerged objects and prevents seaweed from sliding down the line and blocking the tunnel entrances. The surface buoys have two purposes -- (1) to hold at the surface the line from the pot on the bottom and (2) for a marker. Perhaps nothing in the crab industry is more colorful than the brightly painted surface buoys which establish the location of the pot and identify the owner.

The buoy line connects the pot on the ocean bottom with the surface buoys and is also used for hauling the pot from the ocean bottom to the fishing boat. The line is tied to the top frame opposite the lid. Manila rope is preferred for buoy lines since the fibers are hard and will resist continuous immersion and abrasion. The manila line, treated with a preservative, is purchased in coils from which the buoy lines are cut to the desired length, usually one-third longer than the fishing depth. For example, fishing in 15 fathoms requires a 20-fathom line. This allows for the rise and fall of the tide and the action of tidal currents.

Fishing Methods

Baits

Fishermen who have experimented with various kinds of bait to attract the Dungeness crab have come to the conclusion that this crab will feed on most kinds of fish and clams provided the bait is not spoiled. In the Oregon and Washington coastal areas the preferred bait is the razor clam, Siliqua patula, although herring, squid, and salmon and lingcod heads also make good bait. Horse clams, Schizothaerus nuttalli, and butter clams, Saxidomus giganteus, are considered excellent bait in the Puget Sound and bay areas, whereas herring is the preferred bait in the Alaska fishery. Each time the pots are lifted, they are baited with fresh bait cut to fit the type of bait box being used. In recent years, attempts have been made to develop an artificial bait, but none have yet been developed that have proved as successful as natural baits.

Setting the pots

Pots are set in strings, or rows, the length usually depending on the fishing area. Where the shore and bottom contours allow, pots are set in single strings up to 10 miles in length. In the waters of Hecate Strait, pots are set in rows even longer than this with as many as 1,000 pots frequently being set in a single string (Figure 7). Dungeness crabs are usually fished in depths of from 2 to 40 fathoms. Pots are set from 200 to 300 feet apart. Range bearings are taken for locating the pots. Setting a pot simply means dropping it over the side of the boat when the desired location is found. Before dropping the pot, the fisherman checks to make certain that the buoy line is properly attached, the bait box, baited, the lid fastened, the buoy line properly coiled, and the buoys attached. As the pot submerges, the line uncoils from the surface buoys holding the floating end. A straight course is set by the boat operator so the pots will be in a straight line.

Figure 7 - A deck load of pots used in the Hecate Straits crab fishery.

Hauling the pots

When hauling the pots, the boat travels against the current. This allows the fishermen enough time to pick up the buoys and start lifting the pot by the time the boat is over it. The buoys are picked up with a buoy picker (Figure 8), which is a long pole with a wire hook on one end.

Figure 8 - Picking a buoy with a buoy picker.

Figure 9 - Hauling up the pot.

The pot is hauled aboard by two crew members called "boat pullers" (Figure 9). The hinged lid is unfastened, the pot turned upside down, and the contents emptied into a chute from which the crabs are sorted before being placed in the boat's hold (Figure 10). Female and undersized crabs are returned to the water. Male crabs, measuring the required minimum width set by regulation of the state or territory, are retained. Seven inches or more across the greatest width of shell is the legal minimum in Alaska waters. The pot is then baited and made ready to be reset preparatory to picking up the next pot. The boat never stops to haul a pot but keeps traveling at a slow speed, allowing just enough time for hauling, emptying, rebaiting, and resetting before reaching the next pot. An average boat crew can haul and reset about 300 pots per day.

Figure 10 - Emptying the pot.

Pots are often lost by "sanding down" due to foul weather , that is, the pots become buried in the sand when bad weather prevents the fishermen from hauling them regularly. Very few pots are recovered once they sand down. In attempting to lift a pot that has sanded, a tremendous strain must be put on the buoy line. If the buoy line breaks, the pot is lost.

Boats

Boats used in the Dungeness crab fishery range in size from the dory up to 65 feet in length. Dory and gillnet boats are commonly used in the inside waters, while the larger boats (36 feet and over) engage in the outside fishery (Figure 11). The larger boats are generally equipped with holding tanks, or live wells, for these boats frequently travel up to 700 miles to fishing areas. The holding tank is built into the main hold of the boat by constructing water-tight bulkheads fore and aft. The crabs are kept alive until they reach the processing plant where they are unloaded and processed. The holding tank not only assures that the processing plant will receive live crabs but also permits the boats to stay at sea longer.

Figure 11 - Typical Dungeness crab boat of the offshore fleet.

Fresh sea water is pumped into the holding tank by a power-driven pump from 3 to 6 inches in size, operated by a small air-cooled engine. The water is forced through a series of pipes from 1 to 2 inches in diameter, placed about 2 feet apart, which extend the length of the hold from the bottom to about one-third the distance up the sides. Small holes are drilled about 6 inches apart in each pipe. The manner in which the water enters the hold resembles a sprinkling system, allowing the oxygenated sea water to be distributed evenly and preventing suffocation of the crabs. From 400 to 1,000 dozen crabs may be kept alive in this type of holding tank. A separate built-in well extending from the bottom of the hold to just below the hatch combing is generally used to control the volume of water in the hold. Some fishermen prefer to let the excess water spill over the hatch combing onto the deck while others use a second pump to remove the excess water and maintain the water in the hold at minimum level. At the processing plant the water is completely pumped out of the hold prior to unloading the crabs.

The average offshore crab boat operates with a three-man crew -- a skipper and two boat pullers (also called pot pullers). Each man shares in the proceeds of the catch after the expenses are paid.

Regulations

Although commercial fishing regulations vary in different areas, there is one regulation in effect wherever the Dungeness crab is fished -- only male crabs of a specific minimum width of the shell may be taken. Prior to any Dungeness crab fishing venture, prospective fishermen should consult the local regulatory agency for the latest information and regulations.

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